

## Challenging practice for AT2

Name:

### Formula List

For the equation  $ax^2 + bx + c = 0$   $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area,  $A$ , of cylinder of radius  $r$ , height  $h$ .  $A = 2\pi rh$

Curved surface area,  $A$ , of cone of radius  $r$ , sloping edge  $l$ .  $A = \pi rl$

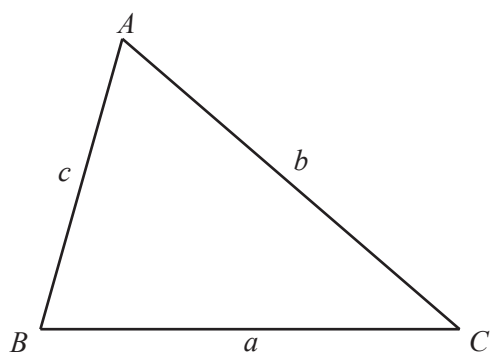
Curved surface area,  $A$ , of sphere of radius  $r$ .  $A = 4\pi r^2$

Volume,  $V$ , of pyramid, base area  $A$ , height  $h$ .  $V = \frac{1}{3}Ah$

Volume,  $V$ , of cylinder of radius  $r$ , height  $h$ .  $V = \pi r^2 h$

Volume,  $V$ , of cone of radius  $r$ , height  $h$ .  $V = \frac{1}{3}\pi r^2 h$

Volume,  $V$ , of sphere of radius  $r$ .  $V = \frac{4}{3}\pi r^3$

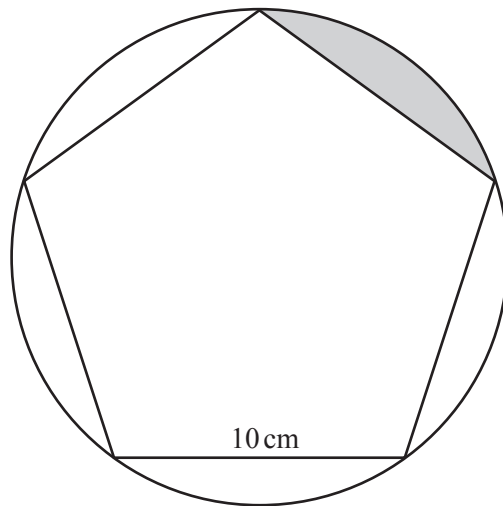


$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$

6



NOT TO  
SCALE

The diagram shows a regular pentagon, of side 10 cm, with its vertices lying on a circle.

- (a) Show that the radius of the circle is 8.51 cm, correct to 3 significant figures.

[4]

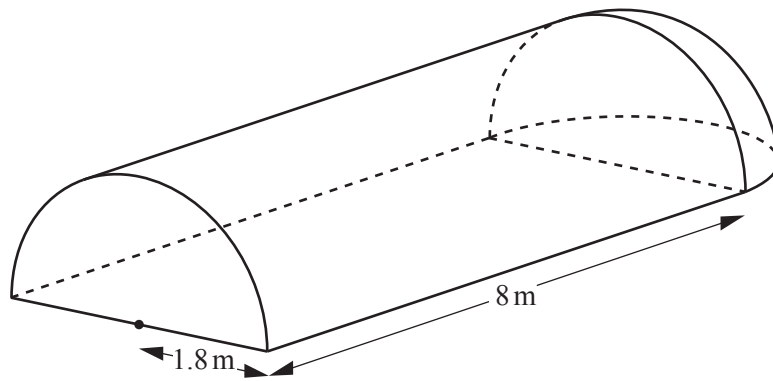
- (b) Calculate

- (i) the perimeter of the shaded segment,

..... cm [3]

- (ii) the area of the shaded segment.

..... cm<sup>2</sup> [3]



NOT TO  
SCALE

The diagram shows a polythene structure in which a farmer grows vegetables. The structure consists of a prism with a quarter of a sphere at **one** end. The cross-section of the prism is a semicircle.

The semicircle has a radius of 1.8 m and the length of the prism is 8 m.

- (a) Calculate the volume of the structure.

.....m<sup>3</sup> [3]

- (b) The curved surface of the prism and the two ends of the structure are made of polythene.

Calculate the area of the polythene.

.....m<sup>2</sup> [4]

**14**  $A$  is the point  $(1, 9)$  and  $B$  is the point  $(7, 1)$ .

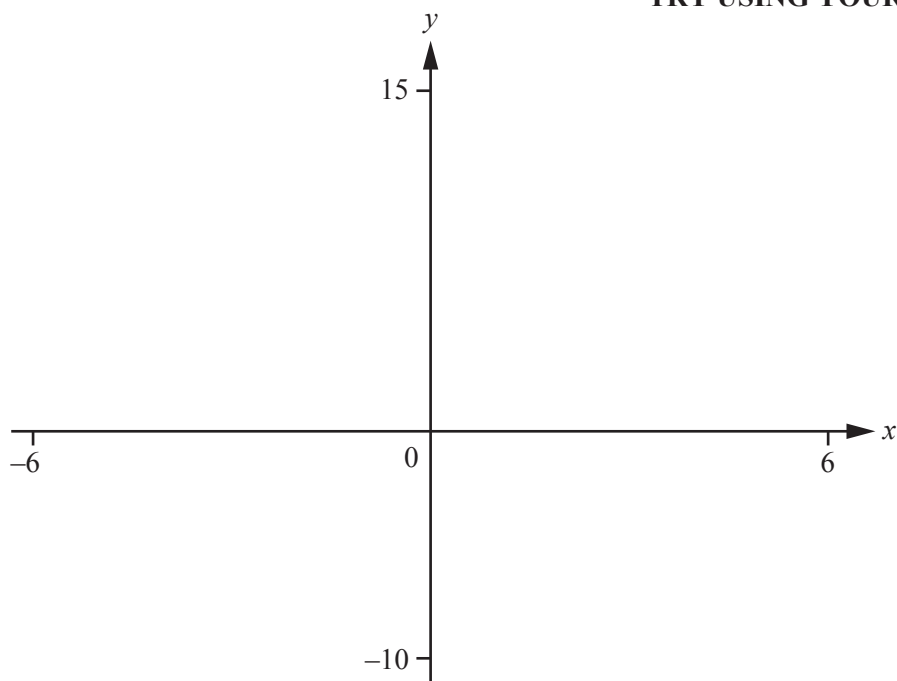
**(a)** Find the length of  $AB$ .

..... [3]

**(b)** Find the co-ordinates of the midpoint of  $AB$ .

(....., .....)[2]

**NOT ON FRIDAY'S TEST HOWEVER  
TRY USING YOUR NEW GDC SKILLS**



$$f(x) = \frac{(2x-3)}{(x+2)}$$

**(a)** On the diagram, sketch the graph of  $y = f(x)$  for values of  $x$  between  $-6$  and  $6$ . [3]

**(b)** Write down the equations of the asymptotes of  $y = f(x)$ .

.....  
..... [2]

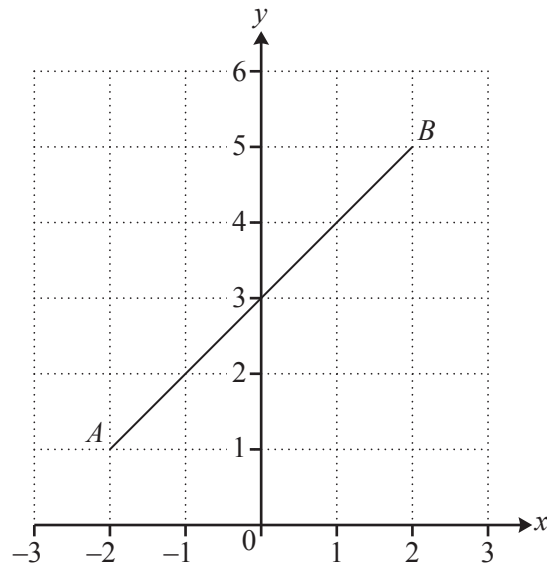
**(c)**  $g(x) = 5 - 2x$

**(i)** Solve  $f(x) = g(x)$ .

**PLOT BOTH AND SEE WHERE THEY CROSS**

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [2]

- 14 The line  $AB$  is drawn on a  $1\text{ cm}^2$  grid.



- (a) Write down the co-ordinates of the midpoint of  $AB$ .

(....., .....) [1]

- (b) Use Pythagoras' Theorem to work out the length of  $AB$ .

$AB = \dots\dots\dots$  cm [2]

- (c) Work out the gradient of  $AB$ .

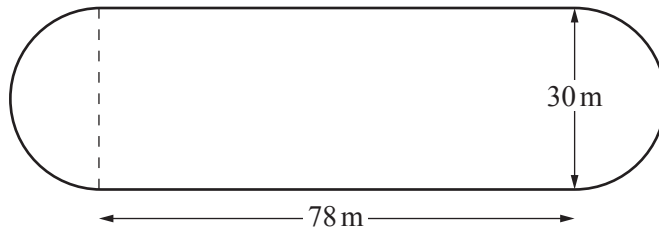
..... [2]

- (d) Write down the equation of  $AB$  in the form  $y = mx + c$ .

$y = \dots\dots\dots$  [2]

**Question 15 is printed on the next page.**

- 10 A cycle track has two straight sections, each 78 m long. Each of the two semi-circular ends has diameter 30 m.



NOT TO  
SCALE

Work out the perimeter of the cycle track.

..... m [3]

- 11 (a) Factorise.

$$5x - 15$$

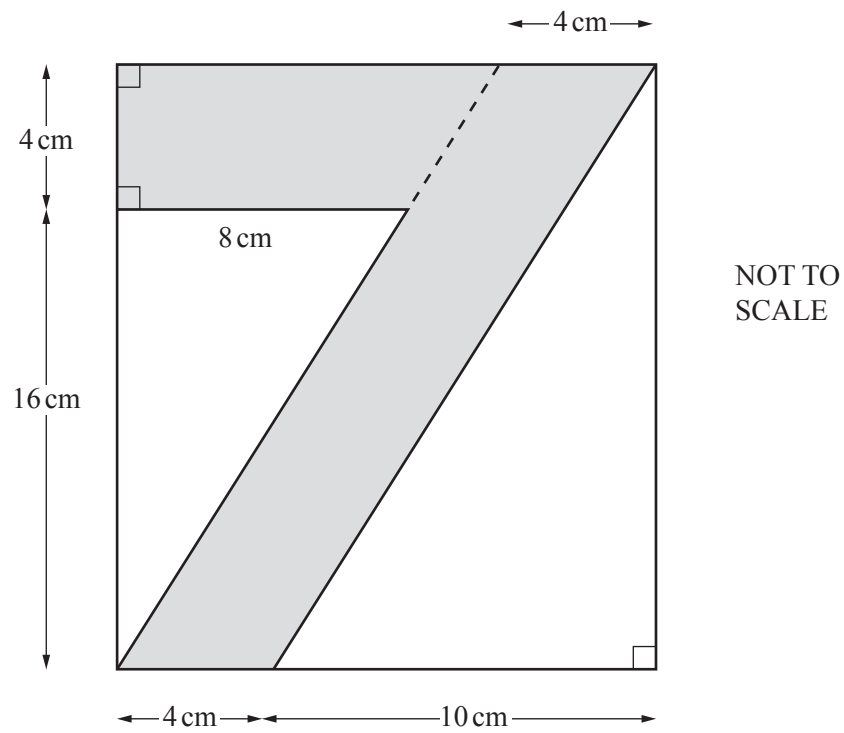
..... [1]

- (b) Solve.

$$4(3x - 2) = 28$$

..... [3]

- 6 The number 7 is drawn on a rectangular piece of paper.



- (a) Work out the area of the rectangular piece of paper.

.....cm<sup>2</sup> [2]

- (b) Work out the total area of the shaded number 7.

.....cm<sup>2</sup> [4]



- 4 (a) Write in figures the number seven thousand and sixty one.

..... [1]

- (b) Write down

- (i) a multiple of 9,

..... [1]

- (ii) an even number between 21 and 29.

..... [1]

- (c) Find the value of

- (i)  $\sqrt{625}$ ,

..... [1]

- (ii)  $11^3$ ,

..... [1]

- (iii)  $5^2 - \sqrt[3]{729}$ .

..... [1]

- (d) Insert one pair of brackets to make this calculation correct.

$$3 \times 6 + 5 - 4 = 29$$

[1]

- (e) Work out.

$$\frac{25.2}{6.1 + 3.8}$$

Write your answer correct to two decimal places.

..... [2]

- (f) Write 0.031 626

- (i) correct to three significant figures,

..... [1]

- 14 Point  $A$  has co-ordinates  $(2, 3)$ . Point  $B$  has co-ordinates  $(4, 11)$ .

Find the equation of the line  $AB$ .

Give your answer in the form  $y = mx + c$ .

$y = \dots\dots\dots$  [3]

- 15 Expand the brackets and simplify.

$$(3x - 5y)(5x - 3y)$$

$\dots\dots\dots$  [3]

$\dots\dots\dots$  [3]

**Questions 17 and 18 are printed on the next page.**

17 Factorise.

$$4x^2 - 4xy - 3y^2$$

..... [3]

18 Write as a single fraction in its simplest form.

$$\frac{n+1}{n-1} - \frac{n-1}{n+1}$$

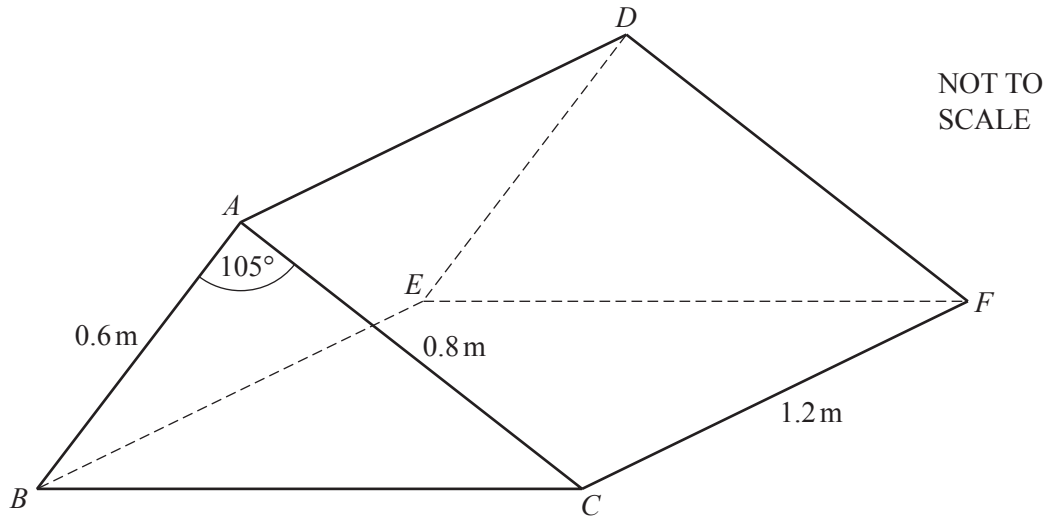
..... [4]

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$ABCDEF$  is a solid triangular prism.

- (a) Calculate the volume of the prism.

..... $\text{m}^3$  [3]

- (b) Calculate the total surface area of the prism.

..... $\text{m}^2$  [5]